Title: **Series-Parallel Circuits** Worksheet: 11

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 46pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate power, current, resistance and voltage for each resistor in a series-parallel circuit.
2. Student shall distinguish the characteristics that a series-parallel circuit exhibits.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Worksheet. Grading shall be based on an answer key.

**Theory**

As the name suggests, a series-parallel circuit contains both a series circuit and a parallel circuit. In the case of a series-parallel circuit, the major circuit is a series circuit, hence the name series coming first in the name. Within the series circuit there exists a parallel circuit. To solve a series-parallel circuit you must first solve the parallel circuits “total” resistance, then use that value to solve the larger series circuit.

**Circuit**

|  |  |
| --- | --- |
|  |  |

Where;

**Instructions**

1. To solve the circuit above, first solve the parallel resistance “totals” using the conductance method.

RAB = 6.967kΩ

1. Next use R1 and RAB to obtain total circuit resistance.

RT = 9.967kΩ

1. Now that we know total circuit resistance, we can calculate the total circuit current.

IT = 1.505mA

1. Using the calculated total circuit current and RAB, you can calculate the voltage drop across the inner parallel circuit.

EAB =

1. Once you have obtained EAB, calculating each branch current is possible.

IR2 = IR3 =

1. Now you have all the information necessary to complete the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 6.795mW | 1.505mA | 3kΩ | 4.515V |
| R2 | 9.995mW | 953.223μA | 11kΩ | 10.485V |
| R3 | 5.786mW | 551.866μA | 19kΩ |
| Total | 22.576mW | 1.505mA | 9.967kΩ | 15V |

**Circuit**

|  |  |
| --- | --- |
|  |  |

Where;

Compute the inner parallel circuit values.

RAB = 1.2kΩ RT = 6.2kΩ IT = 3.226mA EAB = 3.871V

Complete the table below for the parameters and calculated values listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 10.407mW | 3.226mA | 1kΩ | 3.226V |
| R2 | 7.490mW | 1.935mA | 2kΩ | 3.871V |
| R3 | 4.993mW | 1.290mA | 3kΩ |
| R4 | 41.625mW | 3.226mA | 4kΩ | 12.903V |
| Total | 64.52mW | 3.226mA | 6.2kΩ | 20V |